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1967-1968

BADGER WASH COOPERATIVE STUDY WATERSHED COVER AND FORAGE UTILIZATION

by

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Watershed Cover and Forage Utilization

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The U.S. Geological Survey carried out measurements of watershed cover and forage utilization estimates on the Badger Wash hydrologic study for the first time in 1967. This part of the investigation had been done by the U.S. Forest Service since the inception of the study in 1953. In the spring of 1966 the Forest Service withdrew and the work was continued by the Geological Survey.

Two methods of sampling watershed ground cover and plant composition were used in the fall of 1967. A modification of the Parker loop method has been used to record changes in ground cover and plant composition on the Badger Wash Study basins since 1953. It is believed that a greater variation in vegetation may have occurred than has been detected by the loop method, and that a more intensive sampling procedure might better reflect plant cover conditions on the study basins. Therefore, in addition to the loop method, the all points contacts method of recording total hits on plant cover was used in the fall of 1967. A point frame was used with ten pins placed at two-inch intervals. This gave three replications of 100 pins each per fifty-foot transect, while only 100 observations were made with the loop along that same transect. The point frame possesses the three following advantages: 1) a more intensive sample per unit of time is obtained; 2) more plant species are detected; and 3) a more complete sampling of total aerial plant cover which may better relate to runoff and sediment yields than basal plant density.

If there appears to be a consistent relationship between loop and point data, then the former will be abandoned in favor of the more precise point method. If there does not appear to be a reasonable relationship between the two, both methods will be continued with the loop being read at more infrequent intervals.

The point data collected in the fall were field recorded on IBM computer punch cards. The program has not been completed so that that data cannot be summarized at this time. Table I presents the summary of ground cover conditions on the individual study basins and by grazing treatment as recorded by the loop method.

Bare soil has decreased by an average of four hits per 100 on non-grazed basins, and by an average of sixteen hits per 100 on grazed basins since the spring measurements of 1966. The combination of bare soil and rock and ground cover index on non-grazed basins are the same as in 1966. On the other hand, bare soil and rock decreased by an average of six hits per 100 observations and the ground cover index increased by seven percent on grazed basins for the same period. The improved condition on grazed basins was probably due to the extremely light (almost non-use) for the past two grazing seasons.

Forage Utilization--Spring 1968

The Badger Wash grazing allotment changed hands in 1966 from a cow-sheep operation with use from November 15 to May 15, to a sheep operation with winter use only. This is the first year that there has been appreciable grazing since the allotment changed hands. Heavy snow in December forced the rancher to delay grazing until early spring. Use was from March 21-28, 1968. New growth was clearly underway on most grasses (except galleta). Many forbs and shrubs were beginning to grow. Buds were expanding on all three saltbush species, and leaves were beginning to elongate on spiny horsebrush, small rabbitbrush, and snakeweed.

The sheep showed a distinct preference for the new succulent grasses. This probably accounts for the light use on galleta grass which had not made appreciable new growth at the time of grazing.

Use was much greater on Oil Well (3A) basin than on Upper Hanks (1A). This was probably due in part to the greater amount of new growth on Oil Well, and because this watershed contained the only reservoir at which the sheep were watered. It was of interest to note that near the reservoir mat saltbush was heavily used (85-90 percent) whereas on the more distant hillslopes use was light. Use of nuttall saltbush followed the same pattern. Salina wildrye was grazed almost to the ground everywhere it was found. This was in accord with previous use on wildrye, except that use on new growth appeared to be heavier this year than in past years. Salina wildrye has decreased under grazing pressure, and has increased on the protected basins.

The utilization summary for 1968 is presented in Table II. West Twin (2A) and Prairie Dog (4A) basins, which were formerly grazed, have now been fenced to measure the recovery time for those watersheds. Grazing was confined to the upper part of Badger Wash which includes Upper Hanks basin on the west and Oil Well basin on the east.

It was intended that a stocking rate be computed for the pasture in order to duplicate previous use; however, without the fence along the southern edge extending from Upper Hanks to Oil Well, it was difficult to keep the band within the desired area. Computation of a stocking rate will not be as reliable as anticipated.

Soil and Soil Moisture Sampling

In addition to the vegetation survey, intensive soil sampling was carried out on each of the eight study basins. This is the most complete characterization of the different soils in Badger Wash to date. These samples will be analyzed for end of the growing season moisture content and moisture tension throughout the entire soil profile. The soils will also be analyzed for electrical conductivity to determine their salt content, pH, and saturation percentage.

Accompanying the soils work, measurements were made of internal moisture stress of the important shrubs in the watershed. It is intended that these data will give insights as to why different plant species occur where they do, and how plant communities are related to soil characteristics.

Sampling during the fall at Badger Wash was accomplished from September 13 until November 10. A total of 70 man days were spent in the field during that time, half of which was required for the vegetation survey and half for soil sampling and plant tension measurements. Spring utilization estimates were accomplished in two days, March 28-29.

The Geological Survey was assisted for a part of the time in the fall by Mark Morse from the Bureau of Land Management in making the vegetation survey, and in the spring by Bud Motz and Warren Stults, both from the BLM, in obtaining the utilization estimates.

Table 1.--Summary composition of ground cover on individual watersheds--Fall 1967

	Watershed								Average	
	1-A	1-B	2-A	2-B	3-A*	3-B	4-A	4-B	Grazed	Ungrazed
Bare soil	53	59	66	47	70	78	48	53	59	59
Rock	21	18	13	25	11	5	40	31	21	20
Bare soil and rock	74	77	79	72	81	83	88	84	80	79
Litter and moss	20	19	16	15	18	13	9	13	16	15
Plant density index	6	3	5	3	2	4	2	2	4	3
Shrub overstory	16	15	9	14	15	11	10	11	12	13
Ground cover index	31	27	24	33	24	20	16	19	24	25
Annual plants	3	1	2	1	Tr	--	1	Tr	2	1

* Does not include clusters 1, 2, 3, 4, and 6.

Table II.--Summary of utilization and frequency of occurrence--1968.

Species	Upper Hanks - 1A			Oil Well - 3-A		
	Utilization		Frequency percent	Utilization		Frequency percent
	Old	New		Old	New	
Grasses						
mus tectorum	--	0	58	--	10	12
mus salinus	81	48	29	77	26	21
aria jamesii	2	0	67	29	5	54
zopsis hymenoides	13	14	50	46	30	33
secunda	20	2	8	0	32	8
anion hystrix	2	3	54	3	12	25
robolus cryptandrus	0	5	12	--	--	
Shrubs						
emisia spinescens	20	--	8	75	--	4
emisia tridentata	34	--	42	63	--	12
iplex confertifolia	2	--	96	7	--	62
iplex corrugata	5	--	4	52	--	12
iplex nuttallii	--	--		40	--	62
ysothamnus greenii	30	--	71	43	--	58
ysothamnus nauseosus	--	--		0	--	4
edra torreyana	60	--	4	45	--	4
otia lanata	55	--	8	--	--	
ierrezia sarothrae	2	--	62	1	--	33
ntia sp.	0	--	42	--	--	
radymia spinosa	1	--	17	1	--	33

Table II.--Summary of utilization and frequency of occurrence--1968 (continued).

Species	Upper Hanks - 1A			Oil Well - 3A		
	Utilization		Frequency	Utilization		Frequency
	Old	New	Percent	Old	New	Percent
Forbs						
Allium sp.	--	0	67	--	0	12
Aster arenosus	0	--	29	--	--	
Aster venustus	0	0	4	22	0	46
Astragalus spp.	0	0	17	--	0	12
Bahia nudicaulis	1	0	17	--	--	
Calochortus nuttallii	--	1	100	--	1	54
Erigeron pumilus	--	1	21	0	0	12
Eriogonum bicolor	--	--		40	3	8
Eriogonum fusiforme	--	--		--	0	12
Lepidium montanum	5	0	8	--	0	4
Malcolmia africana	--	0	33	--	0	21
Salsola kali	--	0	17	--	0	17
Sphaeralcea coccinea	2	0	54	18	0	25
Unknown forbs	--	0	67	69	--	62

-- Not present

0 Present, not grazed

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